

**EXAMINING THE EFFECTIVENESS
OF THE CURRENT MANNING STANDARDS
SET BY THE HINSDALE FIRE DEPARTMENT
FOR
LADDER TRUCK EMERGENCY RESPONSE**

EXECUTIVE LEADERSHIP

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ABSTRACT

The Hinsdale Fire Department is a full time department that consists of twenty-one full time members, one paid on call member, and covers a community of approximately eighteen thousand people. The department has been in existence for over one hundred years. During that time period, the department has witnessed a tremendous growth in the number of personnel, emergency calls, and types of service provided to the community.

That growth has impacted the service provided by dictating the kind of equipment necessary to effectively deliver the different types of emergency care. Some examples are advanced life support ambulances, hazardous material engine, and a ladder truck response.

This research project will center on one of these pieces of equipment, the ladder truck, and, specifically, the manning standards for emergency response of that vehicle. The Hinsdale Fire Department took delivery of their first ladder truck in 1979 as a result of changes in the makeup of the community. Over the previous twenty years, these changes included the construction of an eighteen story high rise, additional nursing home facilities, and other large life loss potential occupancies.

The minimum ladder truck manning established in 1979 was one person. Additional members from the supplemental manpower (paid on call members) responded whenever possible. This could add as many as three additional personnel on the response. Mutual aid calls for the ladder truck were given a three person minimum response as agreed upon by the neighboring departments who signed the M.A.B.A.S. (Mutual Aid Box Alarm System) agreement.

Over the years, the number of calls the ladder truck has responded on has increased from thirty-five in 1979 to three hundred fifty-five in 1998. Meanwhile the paid on call program has been drastically reduced and is being phased out through attrition. Manning issues effecting the ladder truck were addressed using automatic aid agreements, reassigning fire ground personnel or supplemented by available in station personnel.

The problem facing the Hinsdale Fire Department is that the overall ladder truck response in the emergency operations of the department has grown almost ten times since its inception in 1979. The manning standard has not been adjusted during that same time period and its effectiveness is in question.

The purpose of this research project is to examine the effectiveness of the manning standards set by the Hinsdale Fire Department for ladder truck emergency response. Two research questions will be examined to provide data in this area. The first question deals with whether the current manning standards on ladder truck emergency response for the Hinsdale Fire Department was effective. The second question examines what manning standards do other fire departments in the area use on ladder truck emergency response.

Historical as well as descriptive research methods were used to gather this data. Surveys were mailed to the Chiefs of forty-five departments throughout the Chicago Metropolitan

area. These surveys attempted to identify types of calls the ladder truck responded on, the manning standards, and if the Chiefs felt their manning standards were sufficient.

Accident reports from the Hinsdale Fire Department Safety Review Committee, department log books and fire reports from 1979 to 1998 were examined to determine volume of response and any incidents involving the ladder truck where manning was documented as a contributing factor to the incident. Fire department periodicals, regulatory documents both on the federal and local level, along with applied research projects from the National Fire Academy, were reviewed on the topics of manning and specifically ladder truck manning standards.

The most current M.A.B.A.S. agreement was reviewed to verify the minimum manning standard currently in effect for ladder truck responses from the Hinsdale Fire Department to other communities.

The results indicated that the number of emergency responses the ladder truck responded on from 1979 to 1998 had grown almost ten times. The Safety Review Committee's reports indicated ten accidents involving the ladder truck in the same time period. In all instances, manning was not cited as a contributing factor.

The most current M.A.B.A.S. agreement signed by the Hinsdale Fire Department in June of 1998 calls for a minimum of three personnel on all ladder truck responses.

Twenty seven of forty five surveys were returned and their results indicated a consistent manning within each department as it applied to fire alarms or structure fires. The number responded concerning their minimum manning was not consistent between reporting departments. In only one study from the literature review was a one person ladder truck manning used. The survey of local departments had the minimum standard at two.

The only agreement regarding minimum manning was departments would not drop more than one person below their normal manning to reach minimum manning. There was also no agreement between whether the Chief felt their department manning was sufficient. Some Chiefs who respond with two personnel felt that was sufficient while other Chiefs with the same manning felt it was not sufficient. The same was said regarding a three person response. It was only when the manning reached a minimum of four that all Chiefs agreed it was sufficient.

The recommendations were threefold. The first was to continue the three person minimum manning standard for mutual aid response as that was consistent with our survey results and contractual agreement.

The second recommendation was to continue the current methods to man ladder truck responses by supplementing the one person response with the Deputy Chief and automatic aid companies until an alternate plan for in town responses can be fully researched.

The final recommendation was to begin the research as to the implications of adding an additional person to the ladder truck to bring the minimum manning to two personnel. This minimum would be consistent with a number of departments in our area. Factors such as budget concerns and personnel implications were to be considered.

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INTRODUCTION

The Hinsdale Fire Department is a department that consists of twenty-one full time members, one paid on call member, and covers a community of approximately eighteen thousand people. The department has been in existence for over one hundred years. During that time period, the department has witnessed tremendous growth in the number of personnel, emergency calls, and types of service provided to the community.

That growth has impacted the service provided by dictating the kind of equipment necessary to effectively deliver the different types of emergency care. Some examples are advanced life support ambulances, hazardous material engines, and a ladder truck response.

This research project will center on one of these pieces of equipment, the ladder truck. Specifically, the manning standards for emergency response of that vehicle.

Beginning with the purchase of a used ladder truck (1952 American LaFrance) in 1979, the Hinsdale Fire Department responded a ladder truck on all fire alarms and structure fires in the Village limits as well as mutual aid calls (fires and change of quarters).

The necessity for a ladder truck had been proposed for years due to the target hazards located in the Village limits. Specifically, this spoke to two major hospitals, an eighteen story high rise, and two nursing facilities. The Village Council finally approved this in 1979.

The minimum ladder truck manning proposed in 1979 was one person. Additional members from the supplemental manpower (paid on call members) responded whenever possible. This could be as many as three additional personnel depending on how many paid on call members were in the station when then call came in. Mutual aid calls for the ladder

truck responded with a three or four person minimum per the Mutual Aid Box Alarm System (M.A.B.A.S.) agreement between neighboring communities on minimum manning.

Over the years, the number of calls the ladder truck responds to has increased from thirty-five in 1979 to three hundred fifty-five in 1998. The 1952 American LaFrance was replaced with a 1990 LTI Aerial Platform. This provided a much more versatile ladder truck due to the fact that it now had pumping capabilities. The down side of that enhancement was that if you were pumping and using the ladder function you needed a minimum of three people to operate it.

The paid on call program has been drastically reduced and is being phased out through attrition. Manning issues effecting the ladder truck were addressed by adding automatic aid agreements with surrounding communities in 1994 and assigning those companies to the truck on their arrival. The ambulance driver was also used as an option to bring the truck manning to two on the scene. The Deputy Chief also responded on the truck if he was in quarters.

The problem facing the Hinsdale Fire Department is that the overall ladder truck response in the emergency operations of the Hinsdale Fire Department has grown almost ten times since its inception. The manning standard has not been adjusted during that same time period and its effectiveness is in question.

The purpose of this research project is to examine the effectiveness of the manning standards set by the Hinsdale Fire Department for ladder truck emergency response. Two research questions will be examined to provide data in this area:

1. Is the current manning standards on ladder truck emergency responses for the Hinsdale Fire Department effective?

2. What manning standards are other fire departments in the area using on ladder truck emergency responses?

Historical as well as descriptive research methods were used to gather this data. These research methods utilized a survey sent out to the Chiefs of forty-five fire departments in the Chicago metropolitan area to identify manning standards on ladder truck emergency response and any related issues.

Accident reports from the Hinsdale Fire Department Safety Review Committee, department log books and fire reports from 1979 to 1998 were examined to determine volume of response and any accidents involving the ladder truck where manning was documented as a contributing factor to the incident. Fire department periodicals, regulatory documents, both on the federal and local level, along with applied research projects from the National Fire Academy, were reviewed on the topics of manning and specifically ladder truck manning standards.

BACKGROUND AND SIGNIFICANCE

The Hinsdale Fire Department has been in existence since 1893. During that time the makeup of the organization has evolved from a predominantly paid on call department to a full time department. The number of full time people in 1960 was three with our current staffing at twenty-one. The number of paid on call members in 1960 was thirty-seven compared with one in 1998.

Along with the increases in personnel has come an expansion in the areas of service provided. In 1960, the department responded solely as a fire suppression agency. This service was delivered using engine companies only. If needed, a ladder truck response to Hinsdale was requested from other agencies through the Mutual Aid Box Alarm System.

In 1960, the Village consisted mainly of a bedroom community with a small downtown business district and two small hospitals. The makeup did not require the Hinsdale Fire Department to have their own ladder company.

Between 1960 and 1965, there was considerable growth of target hazard locations (large life loss potential) created by the construction of an eighteen story high rise, two nursing homes, apartment complexes, and considerable expansions to both hospitals. At the same time, call volume was beginning to increase and the demands for overall emergency service were increased by adding emergency medical care in 1970. Full time manpower had remained constant during that time while paid on call fluctuated from between thirty and fifty personnel.

Beginning in 1970, the department began to lobby for their own ladder truck to meet the increased fire call demands and the increase in target hazards in the community. Finally in 1979, the Village Board approved Chief Leo Musch's request to purchase a used ladder truck to evaluate the true need for such a piece of equipment. A 1952 American LaFrance was purchased and put into service on January 1, 1979.

The truck was to respond with a minimum manning of one firefighter on all fire alarms and structure fires. In addition, it would respond to neighboring communities on request through Mutual Aid Box Alarm System.

In order to comply with M.A.B.A.S. policy, it was mandated a minimum of three or four firefighters respond. To meet that requirement, the ladder truck did not respond on mutual aid requests until off duty firefighters reported to quarters. The minimum manning on ladder truck emergency responses in the Village remained at one person even in the face of ever increasing emergency responses and with the addition of more full time people on shift.

Many attempts were made in the ensuing years from 1979 to 1988 to replace the ladder truck due to its age as well as the number of calls it was now responding on. By 1988, the ladder truck was responding to almost five times as many calls as in 1979 (thirty-five versus one hundred sixty-seven).

In July of 1988, the ladder truck's ladder malfunctioned at a house fire rendering it inoperable in the front lawn. The Village approved replacement of the ladder truck and in 1990, the fire department took delivery of a 1990 LTI Aerial Platform.

Since 1979, the overall emergency call volume had increased from six hundred twelve to one thousand three hundred fifty-four in 1990. The department had also increased the full time manning to a six person shift with a five person minimum as compared to a three person shift in 1979 with a two person minimum.

Yet, with all these increases the ladder truck manning was never increased. It remained as it had in 1979 with a one person minimum for in-Village emergency responses and a three or four person minimum on mutual aid responses per the existing M.A.B.A.S. agreement.

There were only a few observable differences. First, the ladder truck no longer waited for off duty firefighters to respond on mutual aid as long as we had the staffing in the station. Secondly, beginning in 1994, automatic aid agreements were signed with neighboring communities in an attempt to bolster the number of personnel on the scene available to be assigned to the ladder truck. Lastly, the Deputy Chief was sometimes available to respond if he was in quarters.

The obvious question over years of examining this manning issue always remained the same. If you needed three or four people minimum on the ladder truck for a mutual aid call,

why do you only need one in the Village? The answer was always that in the Village the ambulance and engine would be responding with a minimum of four more personnel with the ladder truck and personnel could be assigned to the truck, if needed.

Some factors have now accumulated that make re-examining this concept appropriate. They are the decrease in paid on call members to only one, thereby, relying on full time call back to supplement the out of Village ladder truck responses; the availability of in station personnel to supplement in-Village response is minimal; the increase in ladder truck emergency responses to over seven hundred, along with the inconsistency between emergency ladder truck minimum manning as it relates to in-Village responses versus mutual aid; and an increase in the number of reported accidents involving the ladder truck. Each of the above factors dictates the need to examine if the old way of defining and dealing with manning standards for the ladder truck on emergency responses should remain the same.

This research problem is related to the executive development section of the Executive Fire Officer Program. This problem requires the use of analysis skills applied to the current situation and then an evaluation of the factors identified. The results of this analysis may lead to the need for a strategic plan to be introduced at the executive level requiring using the skills of influence and cultural factor identifications that challenges the status quo of the fire department and Village personnel policies.

LITERATURE REVIEW

Various magazine articles as well as applied research projects from the National Fire Academy were reviewed to identify the data on manning standards used for ladder truck response. Hinsdale Fire Department log books, fire reports, and Safety Review Committee records were reviewed to quantify the number of ladder truck responses as well as related

accidents where manning was cited as a contributing factor. Regulatory documents, including the current Mutual Aid Box Alarm System (M.A.B.A.S.) agreement, a study performed for the Federal Emergency Management Agency, Occupational and Safety Health documents, and National Fire Protection Association documents were examined for information regarding studies and regulations for manning of ladder truck responses.

The purpose of this literature review was to examine information written by authorities in the fire service or dealing with the fire service concerning the issue of manning levels. The subject of manning continues to be one of the most contentious subjects in the history of the fire service (Clark,1994). Historically, manning has been considered uniquely a matter of firefighting “efficiency” as opposed to fire fighter safety (Varone, 1994). The relationship of staffing to firefighter safety remains a comparatively new experience (Clark,1994). Assistant Chief Mike Freeman (1985) stated that a 1969 manpower analysis report conducted by the Dallas Fire Department concludes that four firefighters per apparatus should be the minimum acceptable level of staffing.

The literature reveals a concern for inadequate manpower on ladder truck’s almost thirty years ago. It was believed that the lack of adequate manpower is the reason most given for putting off ventilation, forcible entry, and primary search of a fire building (Boychick,1980).

The manning for the ladder truck company was viewed as directly relating to their effectiveness. In fact, it was suggested that in instances where the department did not have a ladder truck company, that specific truck company duties be assigned to members of the first arriving engine company. The engine company would then perform these duties in addition to stretching the first hose line. “This system was designed to function optimally with six

members on the first due engine, although it will still function with a minimum of four."

(Boychick, 1980)

John T. O'Hagen developed much of the research data used to support the findings of the Dallas study during studies conducted in 1969 and 1984. During these times, he measured the "time required to perform critical fire control functions." O'Hagen stated that the most critical factor in the fire protection equation is time as it relates to the development of fire (1984). He also "observed the relative efficiency of overall operations at different staff levels in order to provide the information needed to evaluate the service provided with varying levels of resources." (O'Hagen,1984)

The findings in his fire command study revealed that insufficient manning of fire companies led to delays in performances of critical tasks including longer delays in searching for victims and increased physiological fatigue for the firefighter (O'Hagen,1984).

In June of 1982, the office of the Federal Emergency Management Agency received a report prepared by Centaur Associates regarding a survey on the topic of fire suppression crew practices. This report described the results of a survey conducted by FEMA of existing crew size and initial response practices in cities of at least one hundred thousand population.

The results indicated that the average ladder company was staffed with 3.6 firefighters and ranged from staffing of one to six. At that point in time, the early 1980s, the report already recognized that more than fifty percent of the departments reported some type of reduction in crew size (Centaur,1982).

The respondents were also asked what criteria had been used to determine their crew sizes. The factors most often mentioned were budget considerations, crew safety, and operational or tactical policies. Minimum crew size was defined as a company too small to

operate efficiently and safely. In most departments this level was defined as one man less than the typical crew (Centaur,1982).

“Ladder company performance is most severely affected by improper staffing.” (O’Hagen, 1985) O’Hagen reported that the ability to complete fireground tasks was significantly diminished when a three person ladder company operated rather than a four or five person ladder company.

National Fire Protection Standard number 1500 was first published in 1987 and titled “ Fire Service Occupational Safety and Health Program”. It recommended that for firefighter safety there be four firefighters responding, on or with each engine and ladder company (Hood,1996). In 1991, the NFPA Fire Protection Handbook, 17th edition, stated that in recent years an increasing number of fire departments have established minimum staffing levels for each fire company. It was the policy of many fire departments not to operate ladder truck companies with less than four personnel (Hood, 1996).

In Chief Michael Hendges’, of the City of Jackson Michigan Fire Department, Executive Fire Officer research project on “Staffing of Engine and Ladder Companies” (1992), he studied the number of people needed to be operating on suppression companies. He looked at a pending proposal in 1992 submitted to the National Fire Protection Association (1500) that would have called for the establishment of a four person crew minimum on engine and ladder truck companies.

His research uncovered the fact that experiments held by some cities and universities revealed that if about sixteen trained firefighters are not operating on the scene of a working fire within the critical time period, then dollar loss and injuries are significantly increased, as are the square feet of fire spread. As firefighting tactics were conducted for comparative

purposes, five person fire suppression companies were judged to be 100% effective in their task performance, four person companies 65% and three person companies 38% (Granito, Dionne, 1988).

The 1992 proposal to NFPA 1500 was a rallying point both for and against in the fire service. Chief Alan Brunacini of the Phoenix Fire Department was a strong advocate at that time and wrote in the proposal that “staffing is a vital concern for firefighter health and safety.”(Bruno,1992). At the same time, labor organizations were writing in support of the standard. They presented a lot of statistical data and unpublished research to support the claim that firefighter injuries increase when the manning is below four persons (Hood,1996).

On the other side, management representatives for various Fire Chief’s organizations, including the International Association of Fire Chiefs’, were responding. Their opposition was based on the fact that some municipalities may have to close some stations in order to meet minimum manning at others. Another point of dispute reported the fact that as of 1992, the number of line of duty deaths for firefighters had been reduced (Hood,1996).

In July of 1993, an amendment to NFPA 1500 was issued by the NFPA standards council. While not specifically addressing manning, it required at least four members be assembled on the scene of a working structure fire before interior fire operations could begin (Hood,1996).

In April of 1999, the State of Illinois adopted a Federal OSHA standard on respiratory protection (29 CFR 1910.34) that mirrors the NFPA four person on the fireground amendment. The Department of Labor for the State of Illinois has set a tentative date to begin enforcing it in August of 1999.

Some experts feel the only reliable research data is obtained under fire conditions and that they indicate (Dallas, Columbus, Wisconsin) that the minimum staffing level for engine and ladder companies should be four firefighters (O'Neal, 1994).

In Assistant Chief Randy G. Hood of the Shreveport Fire Department Executive Fire Officer research project on "Shreveport Fire Department Minimum Staffing Study" (1996), he surveyed departments on minimum ladder truck manning and found that four departments used two personnel, one used three, six used four, and four used five (see appendix B). Only the departments who normally responded with five had a minimum manning that dropped to three or four.

In Chief John P. Cratty's, of the Galesburg Fire Department, Executive Officer research project on "A Process to determine Aerial Apparatus Needs for the City of Galesburg, Illinois" (1997), he surveyed forty departments on their minimum manning of the aerial apparatus. He found that three percent send one person, forty-four percent send two, twenty-six percent send three, and sixteen percent send four. There were none that send five, six percent send six and six percent not reporting (see appendix B).

The National Run Survey of 1997 that polled one hundred forty-eight fire departments on their ladder truck manning indicated that zero departments responded with only one person. Six departments responded with two and the rest responded with an approximate average of 3.5 (Campbell, Roache, Evans, 1998).

A review of the current M.A.B.A.S. agreement for the Hinsdale Fire Department is that all departments (twenty-two) in this system will not respond to another town with a ladder company staffed with less than three people per the M.A.B.A.S. agreement signed in June of 1998.

A review of the Hinsdale Fire Department logbooks and run sheets indicate that the ladder truck responded on a total of three hundred fifty-five emergencies in 1998 as compared to thirty-five in 1979. A review of the Hinsdale Fire Department Safety Review Committee reports indicated a total of ten accidents involving the ladder truck. In all ten cases, manning is not cited as a contributing cause. In fact, in three of the instances, there were two people on board.

The literature review provides enough history and conflicting data regarding current Hinsdale Fire Department manning standards and those reviewed that it warrants studying what other departments in the area are doing now. The literature review would also support examining why there is a difference in the manning standard for the Hinsdale Fire Department for mutual aid versus in town responses.

PROCEDURES

A number of assumptions had to be realized prior to beginning the procedures. The first assumption was that the forty five fire departments who received the survey would respond a ladder truck as part of their emergency services on all fire alarms and structure fires with the type of fire alarm or structure fire not impacting the manning. Thus the term “all” included in survey questions number one and two (See appendix A).

The next assumption was that the makeup of the department, career, combination or volunteer would not impact the manning issue since the survey did not inquire as to the time it took to assemble the manning to respond the ladder truck. Time could possibly be more of an impact on combination and volunteer organizations and is not part of this study. It was also assumed that all departments receiving the survey would define ladder truck, fire alarm, structure fire, and mutual aid response similarly to the Hinsdale Fire Department.

It was assumed that reviewing accident records of the Hinsdale Fire Department's Safety Review Committee was important to studying the manning issue as any historical problem impacting manning may be found on record. Their function is to make safety recommendations to the Chief.

It was assumed that personnel, manning, and staffing were terms that were interchangeable as it regarded the number of persons responding on a vehicle both in the literature review and the survey. The term manning is defined as fire department personnel and is not a gender specific reference.

It was also assumed that Hinsdale Fire Department records had accurately documented the number of ladder truck responses and accidents involving the ladder truck.

It was assumed that manning standards could be equated to ladder truck manning effectiveness based on statements and studies in the literature review.

The final assumption was that responses to fire alarm calls may be manned differently than structure fire or mutual aid calls. This assumption generated questions three and four on the survey to measure that concept (see appendix A).

Terms that need to be defined include M.A.B.A.S. which stands for Mutual Aid Box Alarm System. This refers to an organization throughout the country that establishes an orderly system to respond assistance to a community who has taxed its resources. The consenting communities respond specific pieces of equipment with minimum manning standards to an incident.

Ladder truck refers to any type of aerial device used on a fire department regardless of type (straight stick, aerial platform) size, or manufacturer.

Surveys were mailed to the Chiefs of forty-five fire departments throughout the Chicago metropolitan area. These surveys attempted to identify if ladder trucks were responding on all fire alarms, structure fires, and mutual aid calls.

It attempted to identify the number of personnel responding on their ladder truck in various situations. Specifically, these included fire alarms, structure fires, and mutual aid calls.

It also attempted to identify minimum manning standards for the ladder truck response and seek input as to whether the Chief felt their manning standard was sufficient.

Hinsdale Fire Department log entries were examined to verify when the ladder truck went into service as well the number of calls responded to from January 1, 1979 through December 31, 1989. During this time period, the type of vehicle responding was not mentioned on the fire report but in the log book.

Hinsdale Fire Department fire reports from January 1, 1990 through December 31, 1998 were examined to identify the number of ladder truck responses during that time period. The minutes from all Hinsdale Fire Department Safety Review Committee meetings from January 1, 1979 through December 1, 1998 were reviewed to identify accidents with the ladder truck and their causes.

The most current M.A.B.A.S. agreement (6/98) was reviewed to verify minimum manning standards currently in effect for ladder truck response by the Hinsdale Fire Department.

RESULTS

The study of the Hinsdale Fire Department's log books and fire reports reflected that the number of emergency responses that the ladder truck responded on had grown from thirty-

five in 1979 to three hundred fifty-five in 1998. These responses were all inclusive reflecting fire alarms, structure fires, and mutual aid calls for fire alarms and fires.

A review of the minutes of the Hinsdale Fire Department's Safety Review Committee indicated that from January 1, 1979 through December 31, 1998, the committee reviewed ten accidents involving the ladder truck. In all ten cases, manning is not documented as a cause of the incident.

The Committee did recommend after an accident in 1994 regarding the ladder truck returning to the station that, if available, a second person should be assigned to ride back with the one truck operator. This was instituted but did not avoid three accidents since then. In all of those three cases, there were two people aboard and manning was found to not be a factor in future avoidance of similar incidents or in these cases.

The most current M.A.B.A.S. agreement signed by the Hinsdale Fire Department in June of 1998 was reviewed. The agreement states that when rendering mutual aid with a ladder truck or engine, a three person minimum manning shall be observed.

This was amended after great discussion as the previous agreement stated a minimum of four on a ladder company. The amendment was finally agreed upon due to the concern that a time delay factor could be built in to the response equation waiting for four people prior to responding. This is due to the number of combination and small career departments in our organization. It is still strongly recommended by M.A.B.A.S. whenever possible to send four personnel on the ladder truck response.

Twenty-seven of the forty-five surveys sent out to Chiefs of neighboring departments in the Chicago Metropolitan area to examine their manning standards were returned (see appendix A). The surveys indicated the following:

Only one of twenty-seven respondents does not run their own ladder truck response. This department wrote on the bottom of the survey that “we respond two ambulances and two engines with a truck responding automatically from another department.” We will, therefore, only be examining twenty-six respondents for the purpose of the survey results.

Question number one dealt with whether the department responded a ladder truck on all fire alarms. Twenty-three of the twenty six remaining departments stated that they did respond to all fire alarms. Of the three no votes, two clarified that they did respond but “only to target hazards” or “we only have one truck so we may need mutual aid”. The other no vote did not offer any comments under that question.

Question two dealt with ladder truck response on all structure fires. All twenty-six departments responded yes. The comments included “ we must drop one of our engines to make this happen.” This comment is consistent with a concern voiced in the literature review of altering station responses to meet minimum manning, perhaps even closing stations. The other comment was “ we only have one truck and if it is tied up we call for mutual aid.”

Question one and two were both asked to see if there was a difference in the weight given to sending ladder trucks based on the type of emergency. Given that in only one case the answer to question one was an unqualified no, it would appear that there is not a difference in the weight given to ladder truck response between fire alarms and structure fires.

Question three dealt with the personnel responding on these ladder companies going to fire alarms. Six departments respond with two people, six departments respond with three people, five departments stated they respond with three or four people, six departments respond with four people, two departments respond with five people, and one department responds with six.

Question four inquired as to the number of personnel sent on the ladder truck to a structure fire. This was asked to directly compare with question three to see, as we did in question one and two, if there was a difference in the perceived magnitude given to the response based on whether it was a fire or an alarm.

Interestingly enough, in all twenty-six responding departments to question four, the number of personnel responding to a structure fire was identical to a fire alarm. This indicates a parallel between the consistency found on the same issue when comparing the results on question one and two as well as no differentiation of manning in the literature review based on the type of call.

Question five asked about the minimum manning standard on ladder truck responses for the department. Eight departments responded that their minimum was two people, ten departments stated three people, five departments stated four people, one department stated five people, and one department stated six people. One department did not respond but did comment.

Comments provided under this question included “ we send two for an alarm, two for a structure fire, and three to four for out of town.” This contradiction in manning may be directly related to examining the M.A.B.A.S. agreement in the literature review.

The non-responding department did comment in this section that “ we have no set policy in writing for minimum manning. It is our attempt to maintain a minimum of three on all apparatus responding to alarms and telephone reports.” This is consistent with the largest number of respondents to question five (ten) who stated three was their minimum.

The disparity on minimum manning totals is consistent with what was found in the literature review (see appendix C).

Question six elicited a Chief's opinion on whether they felt the manning for the ladder truck was sufficient. Thirteen responded yes, eleven said no, one stated "marginal", and one did not respond.

There was no correlation on this answer between what number of personnel were designated as a minimum on the ladder truck and whether Chiefs viewed it as sufficient. Some Chiefs who have a two person minimum stated it was sufficient while others with the same minimum stated it was not. The same held true for Chiefs with a three person minimum. Only if a Chief answered that they had a four person minimum or higher, did they consistently respond that they felt their manning was sufficient.

This question evoked the most comments. Some of these included "For an aerial to be used at its fullest potential would require five to six people. We will be getting a new truck in June and will be lucky to be able to staff it with two to three people due to lack of funding." This answer again reflects back on the literature review debate between manning issues and concern over possible budget ramifications..

Another comment in this section was "I believe we should all have a four person truck company to safely operate and perform all functions necessary." This was seen in the literature review many times from various sources both management and labor alike.

Other comments reflect ways to meet the manning standard not offered in the literature review but attempted in the Hinsdale Fire Department. "The stations with both ladders also have an ambulance staffed with two firefighter paramedics". "On a report of a structure fire or smoke in the building, one medic will ride as the fourth man on the ladder truck." "Additional manpower is always available when the truck arrives at the scene."

Finally, “We assign the ambulance company that is coming in on automatic aid to our truck which along with our three man minimum makes a five person truck.”

It is apparent from the diversity of answers that even the above methods offered to deal with the manning issue may still depend on your overall minimum staffing and therefore may not be an option to smaller fire departments. It is possible this is why many departments in the national survey in the literature review maintained a three to four person staffing so as to not rely on additional fire scene personnel (Campbell, Roache, Evans, 1998).

The final question dealt with the number of personnel that respond on the ladder truck on a mutual aid call. This was specifically asked due to the discrepancy found in the Hinsdale Fire Department on this very subject, to see if other departments operated similarly.

Of the eight departments in question number five who have a two person minimum, all eight responded they go to a three person minimum for mutual aid. Six of the eight directly commented that this was due to mutual aid agreements. One additional comment was “I can’t assign any of my additional companies responding when they are on mutual aid. They need the manpower when they leave my station!” All departments with minimum manning of three or more stay consistent with their manning standards when they respond mutual aid.

As to the effectiveness of the Hinsdale Fire Department manning standards in our first research question, the Hinsdale Fire Department responds a one person minimum truck company on in-town responses. Our results indicate zero departments respond with only one person on their ladder truck.

Our second research question as to manning standards in surrounding departments has the results indicating that the Hinsdale Fire Department mutual aid manning criteria of three minimum was consistent with surrounding departments.

This would appear to indicate that the Hinsdale Fire Department mutual aid manning is effective, however, the in-town response is not. The results reflected that other departments use a minimum ranging from two to six personnel.

DISCUSSION

There are a lot of common points between our literature review and the actual results of our research concerning the effectiveness of manning standards set by the Hinsdale Fire Department for ladder truck emergency response.

It becomes apparent very early in the literature review that for over thirty years the lack of adequate manpower was cited for fire scene ill wills such as delaying ventilation, forcible entry, and primary search of a fire building (Boychick,1980).

Such a theorized link explains the emotional battles over right and wrong when safety related advisory agencies are approached, such as NFPA, with recommendations regarding manning issues. Manning becomes an issue, whether engine or ladder truck, that agencies hang on to for dear life. We see in our own survey the great disparity between manning levels for ladder truck companies. Yet, our results also indicated a dedication to remaining consistent on manning regardless of the type of call, alarm versus fire.

It is a fact that this constant manning standard for the ladder truck response has been present in Hinsdale since 1979. Even with the fact that the minimum is one, overtime in the form of call backs and scheduled time is allocated to keep the ladder truck responding. With the call volume of the department overall, as well as, the calls for the ladder truck specifically increasing from thirty-five in 1979 to three hundred fifty-five in 1998; the manning standard has remained the same.

It was after a review of past recommendations to advisory boards seen in the literature review, reflecting on the results of the national run survey, and the surveys of various Executive Fire Officer's research projects that leaves one to wonder if our ladder truck manning may be ineffective.

Let's take a look at some of these red flags that have gone up on this issue. As calls for service for the ladder truck company in the Hinsdale Fire Department have increased tenfold since 1979 and the ladder truck capabilities have been enhanced (pump capabilities), we still maintain the job can be done with a one person minimum truck company.

The first piece of the puzzle was to look at how we have been able to function all these years if our manning was short handed based on national and local standards. We can see from question number six in our survey regarding Chiefs' opinions if they feel their minimum truck manning is sufficient, that some departments deal with their ladder truck manning utilizing similar methods to our current operations.

Some comments under this survey question were that an ambulance person might be assigned to ride on the truck to make an additional member. We sometimes have our Deputy Chief assume that role. Another idea included using on scene personnel who were available. We accomplish this through call backs or automatic aid assignments.

We have in place these ideas now as a way of coping with this manning issue. However, each solution carries an inherent problem. Assigning ambulance personnel upon arrival at the scene effectively takes our ambulance out of service. We have documented instances in the last ten years where the ambulance's availability in the first few minutes was crucial for patient care. Even assigning the Deputy Chief assumes he is in the station and does not address any calls at night or on the weekend.

Assigning automatic aid companies works if they are available on the scene. Even with the most expedient response you are adding a seven to ten minute delay before they can be utilized as a truck company.

Utilizing Hinsdale companies on the scene sounds great but, with a five person total minimum response with one engine, one truck, and the ambulance, it doesn't leave a lot of available personnel. According to some studies, you need five person minimum companies to be 100% effective in fire suppression (Granito,Dionne,1998). In fact, the literature review stated that you may need sixteen personnel on the fireground to be effective in all tasks (Hedges,1992).

One would have to ask if the past practice caused us to operate in an unsafe manner leading to accidents? A review of the Hinsdale Fire Department Safety Review Committee minutes indicated ten accidents involving the ladder truck since it's inception in 1979. All indicated that manning was not a contributing factor to the accident. In fact, the only recommendation from the Committee was to add a person when returning to the station to increase visibility due to the ladder truck's size. There were three more accidents after that policy was put into place and all occurred when there were at least two personnel on board. Again, manning was not a contributing factor.

So if manning has not proved to be unsafe to the Hinsdale Fire Department in the past, hasn't it been effective? Perhaps the answer lies in the definition of effectiveness. Effectiveness may not be defined solely by the number of times the ladder truck is involved in a vehicular damaging accident. This is what all ten cases before the Safety Review Committee revolved around. None involved firefighter injury, fire scene concerns or associated topics.

Safety incidents are obviously not the only measure of effectiveness. According to the literature, we have to link safety and manning to measure effectiveness.

Instead of this approach, we may need to look at the historical perspective regarding ladder truck manning as well as current standards nationally and locally. Historically, manning has been considered uniquely a matter of firefighter safety (Varone,1994). The relationship of staffing to firefighter safety remains a comparatively new experience (Clark,1994).

Beginning in 1979, the Hinsdale Fire Department ladder truck has responded with a minimum of one person on in town responses (unless additional personnel were in quarters) and yet three to four person minimum on mutual aid depending on the current M.A.B.A.S. contract.

Where did this minimum manning number come from? Is it four or is it five or three or two or maybe we are right with one! I believe the literature review will lend the historical information. Back about thirty years ago it was felt that even if you did not have a ladder truck crew, the engine crew could perform their duties. In order for this to happen “the system was designed to function optimally with six members on the first due engine, although it will still function with a minimum of four.” (Boychick,1980)

As far back as 1969, in the Dallas manpower study it was concluded that four firefighters per apparatus should be the minimum acceptable level of staffing (Freeman,1985). O’Hagen’s findings in his fire command study revealed that insufficient manning of fire companies led to delays in searching for victims and increased physiological fatigue for the firefighter (1984).

Staffing has mobilized regulatory agencies to study this issue and offer recommendations. In June of 1982, the office of the Federal Emergency Management Agency received a study conducted for them by the Centaur Associates regarding fire suppression crew practices. The results indicated that the average ladder company had 3.6 people but staffing ranged from 1 to 6. This is consistent with our results from survey question three on manning some thirty years later (see appendix A). At that point in time (1982), more than fifty percent of the departments responding reported some type of reduction in crew size. Budget considerations were cited as a factor in the reduction (Centaur,1982). Could that explain the discrepancy in the manning standards of departments of today?

“Ladder company performance is most severely affected by improper staffing.” (O’Hagen,1985) O’Hagen reported that fireground tasks diminished significantly when a three person ladder company operated rather than a four or five person company.

By 1987, the National Fire Protection Association issued a standard numbered 1500 entitled “Fire Service Occupational Safety and Health Program.” It recommended four firefighters responding on or with each engine or ladder company (Hood,1996). This remained only a recommendation.

In 1991, the 17th edition of the NFPA handbook recommended not to operate ladder companies with less than four personnel (Hood,1996). This was followed in 1992 by a proposal sent to the NFPA attached to NFPA 1500 that called for the establishment of a four person crew minimum on engine and ladder companies (Hedges,1992). This proposal evoked pro and con reactions from both management and labor representatives.

Chief Alan Brunacini of the Phoenix Fire Department was a strong advocate and wrote in the proposal that “staffing is a vital concern for firefighter health and safety.” (Bruno,1992)

Labor organizations supported this by stating that firefighter injuries increase when manning is below a four person minimum (Hood,1996).

At the same, time other Fire Chiefs and the International Fire Chiefs Association were debating these facts. They saw the manning issue as a way to increase union membership. The IAFC debated the union representative's facts citing that stations may have to be closed to meet minimum manning standards and that line of duty firefighter deaths had been reduced (Hood,1996).

Here we see clearly the debate that continues today regarding what is the magic number. No one can seem to agree over the last thirty years while looking at the same objective, safe and effective ladder manning. Needless to say that recommendation to NFPA 1500 remained a recommendation only.

The NFPA did issue an amendment to NFPA 1500 in 1993 requiring at least four personnel be present on the fireground before interior firefighting can begin (Hood,1996). This amendment seems to agree with Boychick's article of 1980 that said if you can't have a ladder company have at least four on the engine crew.

The number four historically appears from experts who cite that the only reliable research is data obtained under fire conditions and that they indicate (Dallas, Columbus, Wisconsin) that the minimum staffing for ladder truck companies should be four (O'Neal,1994).

Historically, the studies seem to indicate a recommended staffing of four but where is staffing at in the current fire service both nationally and locally? The national run survey for 1997 polled 148 departments from all over the country on ladder truck manning. The study

indicated that only six departments responded with two personnel, zero with one, and the national average is approximately 3.5 (Campbell, Roache, Evans,1998).

Assistant Chief Randy Hood of Shreveport found in his Executive Fire Officer research project on “Shreveport Fire Department Minimum Staff Study” (1996), that of fifteen departments that returned his surveys, only four used two person ladder companies and zero used one. Regarding the subject of minimum manning he found only departments that were staffed with five person trucks had a lower manning level as their minimum. They dropped to three or four.

Closer to home, Chief John Cratty of Galesburg, Illinois in his Executive Fire Officer research project on “A Process to Determine Aerial Apparatus Needs for the City of Galesburg, Illinois” (1997), found that three percent of departments returning his survey on minimum manning levels for their ladders responded with one person. Forty-four percent respond with two personnel, forty-eight percent send three personnel or more, and six percent did not report.

What did our survey regarding neighboring communities indicate? Forty-five surveys were sent out with twenty-seven responding. Only one department reported that they did not respond with a ladder truck. Instead they relied on an automatic aid truck company. This “option” may be something departments face in the future if ladder truck manning becomes too costly or forces station closings as an option (Hood,1996).

Questions one and two in our survey were asked independently to measure if there was any perceived difference in importance between a fire alarm and a structure fire as it related to a ladder truck response. This was in the hope that if a department just responded to ladder truck on fires, it might not create an accurate picture.

Question one and two reflected no significant difference between seeing the need for a ladder truck response based solely on the type of call. All twenty six departments responded a ladder truck to structure fires while twenty five of twenty six responded with some type of protocol on fire alarms.

Questions three and four dealt with the critical issue of manning on ladder trucks. Again these two were compared for consistency on fire alarm response versus structure fire. The results indicated from question four regarding structure fire manning, that all twenty-six department's manning remained constant from fire alarm (question three) to structure fire.

The answers to these four questions would support the literature review in that all studies and recommendations reviewed did not differentiate in their manning recommendations between alarms or fires. What was very different was the staffing numbers for the various departments. It mirrored closely Chief Hood's (1996) survey results of staffing ladder companies. His results ranged between two to five. Chief Cratty's (1997) study indicated a range from one to six while the national run survey (1998) ranged from two to six (see appendix B).

Our survey indicated a range of two to six. The variance is obvious and consistent across national and local levels. Question number five on minimum manning standards begins to clarify the issue a little. What we see is that while the range for departments is commonly two to six, more departments are operating with a minimum of 3 or more (see appendix B). Seventeen of twenty-six had a minimum of three or higher.

When examining all minimum manning information provided in various studies, the consistent factor was that no department dropped more than one personnel when reaching their minimum and the vast majority still responded with at least a three person truck (see

appendix C). It would appear that a three person truck is becoming more of the standard/reality than the four person recommendation. This may be a direct result of budget reductions.

Question six questioned Fire Chiefs whether their ladder truck manning was sufficient. The results were thirteen Chiefs said yes, eleven said no, and one said marginal. The interesting factor here is that there was no consistency on defining their manning as sufficient based on the number of people currently responding. Some Chiefs with two felt that was sufficient while others didn't. The same was true for departments responding with three.

Only when you reached Chiefs with manning of four personnel or higher did they feel their manning was sufficient. Could that be the magic number indeed? Yet, there were still comments under this section with Chiefs hoping to have five to six personnel. On the surface, it appears that disagreements in this staffing issue may be more of a function of past practices and budget impact than any consistent national or local standard.

The other responses under "sufficient" manpower indicated attempts to meet this manning issue with alternate ideas. The idea of reassigning personnel, adding automatic aid, or even not running your own truck are ideas that other departments are dealing with.

Finally, question number seven dealt with the question of manning on mutual aid. This was designed to measure the other staffing issue that the Hinsdale Fire Department deals with. It was found that of the eight departments who have a minimum manning of two, all responded a minimum of three on mutual aid. Six of those eight departments cited their mutual aid agreements as driving the difference.

So where does all this leave the Hinsdale Fire Department in terms of the effectiveness of our ladder truck manning? It is clear that in regards to our second research question

regarding area fire department manning standards, that of the twenty-six departments responding, none respond one person on the truck in any circumstance. The lowest minimum manning is two personnel by eight of twenty-six departments.

Regarding our first research question as to the effectiveness of our current minimum manning standards; we can see that in terms of our mutual aid response, we are in line with national and local standards. It is the day to day response in the Village that, on minimum manning data, appears to be ineffective (see appendix C).

The data indicates the need to add personnel to the one person minimum manning. The current use of on duty personnel, the ambulance in particular, is negatively impacted by the frequency with which the ambulance is on emergency medical calls, as well as, the documented need for a functioning medical unit on the scene in the first few minutes of the incident. The availability of the Deputy Chief to supplement the truck response is limited at best.

Requesting automatic aid is currently used but is impacted by the coming adoption by the Illinois Department of Labor of the OSHA respiratory standard in August of 1999, which mandates four firefighters on the fireground prior to beginning interior firefighting. Departments may need to keep a tighter rein on keeping their people in town.

It would appear that the current manning standards on ladder truck responses has two components when evaluating its effectiveness. Mutual aid responses fall within national and local standards as to recommended manning levels (three minimum).

The second component is the manning for ladder truck emergency response within Village limits. This does not meet recommended standards for effectiveness. This is based on

national and local manning surveys that are consistent regarding not using one firefighter as a manning standard (see appendix C).

The obvious implication to the organization is to determine what course of action needs to be taken to answer this staffing issue. Increase in any staffing would have obvious budget implications. Another implication would occur in the personnel hiring practices for the Village, which has adopted a policy to not add positions.

Even if a staffing addition was approved, how many additional personnel would be needed? The implications here relate to vacation availability, which might impact overtime allocation, seniority, etc.

Another implication might be that the Village administration chooses to not have a ladder company and instead use the option of an automatic aid truck as the one respondent to our local survey did. How is that administrated? Does it effect current manning standards? How would the general public react?

In any event, the largest implication is that this matter can not be resolved without requiring further study based on a specific plan of action.

RECOMMENDATIONS

The purpose of this research project was to examine the effectiveness of the manning standards set by the Hinsdale Fire Department for ladder truck emergency response.

The problem has been that while ladder truck response had grown tenfold since 1976, the manning standards for the Hinsdale Fire Department had not been revised.

Factors such as historical perspective on manning recommendations, studies on ladder truck manning conducted over the last thirty years, regulatory recommendations and

applicable laws, along with the standard provided by the area fire departments were evaluated to determine the efficiency of the current manning standard.

The effectiveness of the ladder truck manning standards for emergency response set by the Hinsdale Fire Department can be separated into two components. One is in-Village responses where the standard for manning is a one person minimum. The second is the mutual aid minimum manning standard of three.

The literature review indicated a discrepancy regarding a specific number as the “ideal” number reflecting the most effective ladder truck manning. There was, however, a consistency in the historical studies directly correlating the number of personnel to fire ground effectiveness. The studies indicated a minimum of two to six was the standard. This was inconsistent with current Hinsdale Fire Department manning standards of one person set in 1979.

This caused the review of manning standards currently in use locally and any national data available. Again, there is a discrepancy on the number of personnel departments use to man their trucks (see appendix C). The standard for mutual aid manning, however, was consistent with current Hinsdale Fire Department manning standards. The recommendation here is to leave this standard as is at a three person minimum.

The next recommendation is to continue the current methods to man ladder truck responses by supplementing the one person response with the Deputy Chief and automatic aid companies until an alternative plan can be researched. This is an attempt to increase the manning standard to at least two.

The next recommendation would be to begin research as to the implications of adding one more person to the ladder truck manning. The current manning is ineffective as seen in

our survey of surrounding towns where zero departments send only one person irregardless of the type of call. While this is not the “ideal” standard of four, it is consistent with the minimum manning number of a number of departments in our area which was two (see appendix B).

Factors in the research will include budget impact regarding not only salaries but benefit conflicts with current personnel. The Village Finance Director should be included in this research to provide expertise on any personnel areas that may be impacted.

Finally, the departments that responded should be canvassed for similarities to the Hinsdale Fire Department, i.e., size, career, and population to verify the applicability of the study. An additional survey may be needed to be sent only to departments targeted as comparable to Hinsdale to compare the results.

This process should begin immediately to have a plan in the presentation stage by fall before budget preparation begins.

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APPENDIX A
NATIONAL FIRE ACADEMY
EXECUTIVE FIRE OFFICER SURVEY

1. Does your department respond with a ladder truck on all fire alarm calls?

YES _____ NO _____

COMMENTS: _____

2. Does your department respond with a ladder truck on all structure fire calls?

YES _____ NO _____

COMMENTS: _____

3. How many personnel respond on your ladder truck on a fire alarm? _____

4. How many personnel respond on your ladder truck on a structure fire? _____

5. What is the minimum manning standard for your department regarding ladder truck response?

6. Do you feel your ladder truck manning is sufficient?

YES _____ NO _____

COMMENTS: _____

7. How many personnel respond on your ladder truck on mutual aid calls? _____

COMMENTS: _____

APPENDIX B ALL SURVEYS SUMMARY

	Number of Departments														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	❖	☆													
5	❖			*											
4					❖ *	☆									
3	*								☆	❖					
2			*					❖							☆
1	☆														
0															

- * SHREVEPORT
- ☆ GALESBURG (converted from % to whole numbers)
- ❖ RESEARCH PAPER SURVEY

APPENDIX C
MINIMUM MANNING
ALL SURVEYS TOTALS

